

## **Biomimetic fly eye sensor for real-time target tracking**

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### **Abstract:**

The project objective is to design, build, and demonstrate a biomimetic (inspired by biology) smart sensor based on the common house fly eye for real-time target tracking in three dimensions (3-D). The sensor makes use of revolutionary optical sensor design resulting in significantly improved motion detection capabilities when compared with conventional optical sensors. The design is motivated by the parallel nature of the fly's vision system and its demonstrated hyperacuity or precision of visual localization beyond the conventional resolution limit. This means that the sensor is able to accurately detect very fast motion and small changes in motion. The analog architecture of the sensor allows for real-time solution at adjustable bandwidths depending on the application. The low cost, exceptionally lightweight, small form factor, low power requirements, and low computation requirements of the sensor make it ideally suited to many aeronautics applications that have limitations on weight, power, and processing time. The sensor is modular and can be easily adapted in scale and manufactured for a wide variety of sensing applications. Advanced target tracking algorithms will be developed to allow the sensor to track a target in 3-D. These algorithms will be implemented in the smart sensor's hardware to enable real-time target tracking.